ABSORPTION CROSS SECTIONS OF ISOBUTANE AND ITS POTENTIAL PRESENCE IN TITAN'S ATMOSPHERE

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The atmosphere of Titan, one of Saturn's moons, is of great interest to the scientific community. With its primary components of nitrogen and methane, many believe Titan to be an analog of prebiotic Earth. The Cassini-Hyugens mission, launched in 1997, gathered massive amounts of data from both Saturn and Titan that is still being interpreted. Analysis of astronomical spectra is dependent on high-quality laboratory spectra. In the case of Titan this includes small hydrocarbons such as ethane, propane and benzene that are the products of photochemistry of methane. One complication that arises when making these assignments comes from incomplete or absent line-by-line spectroscopic data commonly used to determine molecular abundances. This problem can be avoided by utilizing absorption cross sections, as they are only dependent on the environment of the target molecule, environments that can be replicated in the lab. One of the molecules that potentially exists on Titan is isobutane. This talk focuses on the absorption cross sections of isobutane needed for for Titan and the Giant Planets. Absorption cross sections were obtained for pure samples, and with hydrogen and nitrogen broadening gases. The data were taken between 203 K and 295 K, at broadening gas pressures ranging from 0 Torr to 100 Torr, in the CH stretching region (2500-3280 cm^{-1}) and from 1050 $\mathrm{cm}^{-1}$to 1900 cm^{-1}. Calibration of the cross sections were carried out using data from the Pacific Northwest National Laboratory (PNNL) infrared database. These cross sections were then used to calculate an upper limit for isobutane in Titan's atmosphere.